

Imperial Institute of Agricultural Research, Pusa

The Production of Oranges in Spain

BY

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The Production of Oranges in Spain.

(Received for publication on 16th April 1929.)

Introductory. Spain supplies by far the largest part of the oranges sold in Europe. Regardless of the growing importance of Jaffa, South Africa and Australia, due to her proximity to the markets and numerous natural advantages for orange production, Spain will undoubtedly continue to be the controlling producer. In competitive production her contribution will regulate the price levels of the other countries exporting to Europe.

Oranges exported. The present total export amounts to 15,000,000 cases contributed as follows :—

Total shipments to the United Kingdom, 1926-27.

	Month	Cases	Half cases
1926—			
September
October	722	4,982
November	34,162	640,342
December	48,472	931,026
1927—			
January	19,409	510,702
February	41,800	857,959
March	43,187	867,857
April	20,124	486,236
May	13,792	563,667
June	3,626	198,682
July	573	35,158
August	881
		225,867	5,097,492
Shipped from—			
Castellon	16,853	484,100
Burriana	95,134	1,272,625
Valencia	105,162	1,701,610
Gandia	8,513	1,022,839
Cartagena	205	616,318
Total—			
1926-27	225,867	5,097,492
1925-26	294,640	6,101,503
1924-25	289,533	6,481,930

PRODUCTION OF ORANGES IN SPAIN

Total shipments to the Continent, 1926-27.

	Month	Cases	Half cases
1926—			
September
October
November	.	75,784	428,011
December	.	79,469	774,854
1927—			
January	.	41,612	497,632
February	.	51,809	663,161
March	.	30,301	547,950
April	.	9,161	311,148
May	.	9,813	130,090
June	.	1,070	6,209
July	.	454	169
August
		299,473	3,379,224
Shipped from—			
Castellon	.	23,266	476,439
Burriana	.	13,251	180,625
Valencia	.	228,989	1,671,605
Gandia	.	3,024	780,884
Cartagena	.	30,943	369,671
Total—			
1926-27	.	299,473	3,379,224
1925-26	.	393,632	3,979,432
1924-25	.	374,144	4,761,092

Analysis of shipments to different ports in United Kingdom, 1926-27.

	Port	Cases	Half-cases
London	.	58,615	2,018,357
Liverpool	.	61,925	1,221,056
Hull	.	20,593	410,734
Manchester	.	26,760	333,700
Newcastle	.	6,790	133,144
Glasgow	.	16,324	272,187
Bristol	.	1,747	359,642
Cardiff	.	12,441	161,049
Southampton	.	7,373	163,723
Dublin	.	1,555	25,482
Belfast	.	1,744	28,424
Total to United Kingdom ports	.	225,867	5,097,492

Analysis of shipments to different Continental ports, 1926-27.

Port	Cases	Half-cases
Hamburg	70,838	1,504,887
Rotterdam	23,209	627,560
Amsterdam	12,213	265,015
Antwerp	18,302	634,717
Bremen	7,766	235,997
Denmark	30,053	56,343
Norway	107,188	12,544
Sweden	29,672	33,495
Finland	232	8,666
Total to Continental ports	299,473	3,379,224

Exports by wagon : 1924-25.

1. 20,000 wagons containing 5,000 kilos of fruit.
2. 6,000 wagons containing 10,000 kilos of fruit.

Statistics indicate that the annual consumption of oranges per head is 7 in Spain, 15 in Germany, 18 in Holland, 23 in Belgium and 57 in England. Spain exports 95 per cent. of her total production.

The orange tract. The orange is grown all along the southern coast of the country, but the commercial production is more or less concentrated within a distance of 200 miles, the most important northern section being Castellon, the southern Murcia. The city and district of Valencia occupies a central position and is to the orange industry of Spain what Los Angeles is to that of California. Valencia contributes no less than 12,000,000 of the 15,000,000 cases exported from Spain. The tract is so far north as Lat. 40°, but is sheltered by mountains and favoured by the warm Mediterranean Sea air. The earliest and best oranges are grown on the Ribera section of the Valencia district.

Climate. The four periods of the year are well marked and seasonable. The spring opens in February. The weather is mild and calm, the prevailing wind, known as the "garbi" blowing from the south-east. Occasionally a hot wind, called the "poniente" injures the carrying qualities of the oranges. The temperature and rainfall are as follows :—

Month	Normal maximum temperature	Normal minimum temperature	Normal mean temperature	Normal rainfall
February .	17.2°C = 63°F	5.3°C = 41.5°F	11.2°C = 52.2°F	945.5 mm. = 37.2 in.
March .	18.2°C = 64.8°F	7.0°C = 44.6°F	12.6°C = 54.7°F	1,162 mm. = 45.7 in.
April .	20.7°C = 69.3°F	9.2°C = 48.6°F	14.9°C = 58.8°F	1,045.9 mm. = 41.1 in.

The summer arrives in May in no uncertain manner, the temperature rising rapidly and glowing azure sky prevailing. The 'garbi' wind still blows, with occasional hot withering blasts of the 'poniente.' The temperature and rainfall are as follows :—

Month	Normal maximum temperature	Normal minimum temperature	Normal mean temperature	Normal rainfall
May . .	23.7°C = 74.7°F	12.3°C = 54.1°F	18.0°C = 64.4°F	1,050.6 mm. = 41.4 in.
June . .	27.1°C = 80.8°F	15.5°C = 59.9°F	21.3°C = 70.3°F	592.6 mm. = 23.3 in.
July . .	29.7°C = 85.5°F	18.8°C = 65.8°F	24.2°C = 75.6°F	379.1 mm. = 14.9 in.

Autumn. The advent of this season is not appreciably observed till September. The temperature and humidity throughout August are the highest in the year and the days are very trying. With the heavy downpouring rain which sometimes falls in September, the cool weather begins. The temperature and rainfall are as follows :—

Month	Normal maximum temperature	Normal minimum temperature	Normal mean temperature	Normal rainfall
August .	30.3°C = 86.5°F	19.3°C = 66.7°F	24.8°C = 76.6°F	286.4 mm. = 11.3 in.
September .	28.1°C = 82.6°F	16.8°C = 62.2°F	22.4°C = 72.3°F	2,281.9 mm. = 89.8 in.
October .	24.2°C = 75.6°F	12.6°C = 54.7°F	18.4°C = 65.1°F	2,395.6 mm. = 94.3 in.

Winter. Not until the middle of November is it realized that the cold season has begun. Alternating cloud and sunshine with occasional showers of rain followed by considerable cold but rarely by frost, prevail

until the spring is ushered in once more. The temperature and rainfall are as follows :—

Month	Normal maximum temperature	Normal minimum temperature	Normal mean temperature	Normal rainfall
November .	19.6°C = 67.3°F	8.6°C = 47.5°F	14.1°C = 57.4°F	1,556.8 mm. = 61.3 in.
December .	15.7°C = 60.3°F	5.0°C = 41.0°F	10.3°C = 50.5°F	1,490.8 mm. = 58.7 in.
January .	15.4°C = 59.7°F	4.3°C = 39.7°F	9.8°C = 49.6°F	1,020.9 mm. = 40.2 in.

On four occasions only in the past 30 years have the oranges been injured by frost. The trees were checked but not seriously injured. In consequence no 'smudging' or other precautions to ward off frost have been deemed necessary or at least worthy of the great expense which their employment entails. A southern aspect is favoured for the groves, and wind-breaks are planted to shelter the more exposed from the cold north wind.

The soils. Where the area has proved suitable, where the requisite irrigation is available and, most important, where the land is naturally well drained, orange groves occupy the land almost to the exclusion of other crops. Throughout the centuries that have passed since the orange first was planted, the land has been skilfully, laboriously terraced, tilled and fertilized until now it is exceedingly fertile and favourable to citrus production. Some of the tract is rich brown alluvium free from gravel; large areas are of porous silt from the hills that are never far distant. The most bountiful crops of the best oranges are grown on small, terraced, freely drained patches of warm red loam liberally mixed with nodular limestone. Nowhere do flourishing groves exist on land that is not well drained, or indeed where the water-table is within 20 feet of the surface. A soil that is sticky or tenacious after irrigation or rain is considered unfavourable to the orange.

Irrigation. The supply of water for the various canals is mostly taken by direct flow from the rivers or streams, but a little is pumped from some convenient source or lifted from the well by the old-fashioned "Neria" or water-wheel. Probably three-fourths of the groves in Valencia are treated by the canal distributaries and branches through open ditches. The main irrigation schemes were planned and executed by the Moors in the years 1200 to 1500, and they are still considered efficient and satisfactory. They are administered and directed by a

commission elected by the owners of the water-rights from amongst their own number, its functions differing little from those of the days of long ago. There are about 100 separate river canals and branches in the province of Valencia. The charge for water ranges from so little as 3s. to 15s. per acre.

In accordance with the rainfall the grove is irrigated from 10 to 15 times, the first application being given in March, the last usually in October. The quantity applied is about 18,000 to 20,000 gallons per acre per turn. For the facile distribution of the flow, the land is plotted first into perfectly level fields, thereafter into squares, each tree being the centre of its own plot or shallow basin. Where the levels and other circumstances are unusually favourable, the flow may be applied down the lines of trees, a ridge of soil between these serving to retain the water until all in the line are treated. The water is never applied by the "furrow system." A light hand-hoeing, not deep cultivation, is given if possible after each alternate watering.

Fertilizing the grove. The land is generously manured. To the tree showing weakness the scanty supply from the farm yard is given with solicitous care; the grove as a whole receives artificial fertilizer. During the period of the Great War, the orange industry was so profitable that the growers endeavoured to increase their crops by using fertilizers and, finding the results good, they have continued to employ them until now they are almost exclusively in favour. A popular mixture has the following composition :—

30 to 40 per cent. sulphate of ammonia,

50 to 60 per cent. superphosphate,

8 to 10 per cent. chloride of potash.

The extraordinarily great quantity of about 1,400 lb. per acre is quite commonly applied. In the use of fertilizers the growers have had to rely on the results of their own experience, no dependable experiments having been undertaken on their behalf. They have concluded that under irrigation, nitrate of soda is liable to be lost or too quickly taken up by the trees, whilst sulphate of ammonia is more dependable in these respects. The shippers hold that the oranges were less liable to decay before the fertilizers were commonly used.

Intercropping and cover-crops. Until a young grove has attained the age of five years intercrops are taken, their choice being decided by the local market demand. The enrichment of the soil by growing leguminous crops is well understood and, other factors being favourable, they are freely planted. The mature grove is rarely given a cover crop, either in summer or winter, yet the horsebean (*Faba vulgaris*—

locally called *Haba farragera*) is grown throughout the tracts to be ploughed in for the enrichment of the vegetable and agricultural land.

Propagating the trees. On the drier, sandy soil of the foot hills, the rough lemon (*Citrus Limonum*, Osbeck) is the root-stock most in favour. For the richer, heavier loams which retain moisture better, and which constitute by far the greater part of the orange land, the bitter orange (*Citrus Aurantium*, Linn.) is used. It is remarkable that though this bitter orange is indubitably the same as that bearing the name in north-west India, it is not a congenial stock there. Indeed it is not understood by scientists why this sour orange has proved quite unsuitable to the sweet orange of commerce in South Africa, Australia and India, yet is indisputably the best stock in America and Spain. The preparation of the plants in the nursery is similar to that employed wherever the budded orange is grown. The seed of the stock may be sown for example, in March or April 1925: the seedling are transplanted to the nursery lines in the following autumn: in June 1927, the seedlings are budded: in February or March 1928 the more vigorous plants may be transplanted to the grove; but perhaps the greater number are given another year's preparation in the nursery. When finally set out in the grove the budded sweet orange is either eight or twenty months of age from the time of budding. In the Valencia nursery the plants are not staked or kept strictly exact as they are in the nurseries of America, Australia or South Africa and this is probably the real reason why the orange trees in Spain are low and spreading, lacking a true single trunk. It explains why the grower must cultivate by hand rather than by horse-drawn implements. The important facts in the propagation of the sweet orange in Spain are that the bitter orange stock gives excellent results on the best loams, and the rough lemon on the drier sandy land. No very decisive trial of sweet orange stocks appears to have been undertaken in the country.

Laying out the grove. The trees are set out by the square system at 16×16 feet if all the cultivation is to be done by the spade, or at 20 to 24 feet apart where cultivation by horse-drawn implements may sometimes be necessary. In very few of the groves is it now possible to use animal power, yet it can hardly be said that anywhere are the trees actually overcrowded. The oranges are vigorous but by no means too much so.

Shaping and pruning. The trees are invariably bushes, not shapely round headed half standards, such as comprise the American, Australian or South African groves. Nor are the Valencia trees nearly so big as in these newer countries. The Spanish grower favours the open bush tree, aiming at getting the fruit disposed over all the branches.

In the commercial groves of most other countries the oranges are borne chiefly on the outer surface of round, rather ornamental trees. The Valencia grower endeavours to get well matured vigorous branches, capable of bearing oranges. He gives close attention to each individual tree. A certain amount of pruning is done in every grove, either annually or in alternate years to keep the tree open yet well supplied with fruitful branches. An experienced workman treats from eight to twelve trees per day at a cost of 4d. to 6d. each.

Implements, tools and tillage. The grove is ploughed to a depth of five or six inches in March, usually by a country plough, differing little from that employed in India and Egypt; or it is dug by a large mattock or draw hoe similar to the *Kodaki* used to dig land in the Punjab of North-West India. The English type of spade is never used. The plough is drawn by one animal which may be either a cobby pony or a mule. In a few groves an efficient furrow-turning, one-way plough is employed. The harrow or the cultivator is rarely used. Certainly the tools and implements are of ancient date, yet they are efficient, and assuredly the results obtained by their use are good; and they are probably economical. Most of the small holders keep a horse, a mule or a donkey. None uses oxen in the grove.

Insect pests. In restricted parts the scale insects do considerable injury, yet it may be said that rarely are they abundant or destructive in the best managed groves. The Florida red-scale (*Chrysomphalus dyctosperma*, Linn.) is the commonest and most baneful. Next in destructiveness is the black-scale (*Saissetia oleæ*, Bern.), and it is noteworthy that this is not the pest known as the 'black-scale' in California. Others which are sometimes both abundant and destructive are the purple-scale (*Lepidosaphes beckii*, Newn.), and the long scale that also is purple (*Lepidosaphes floridensis*, Com.). To control them spraying has been practised but fumigation is slowly coming into favour, and its adoption is vigorously advocated by the Cyanamide Company of the United States, America, which has a factory in Valencia, and guides the men who undertake fumigation by contract or otherwise. The cost of fumigation is from 1/3d. to 1/6d. per tree. The Mediterranean fruit-fly and the mealy-bug sometimes appear in August, but are not very destructive pests.

Diseases. Not very much is known about the diseases occurring in the groves, but it may be said that they are neither numerous nor very destructive. 'Gummosis' is present and might be destructive were measures to check it not generally adopted. The method of prevention is simple and, it is said, most effective, consisting merely in removing the soil each cold season from the base of the tree trunk, and

from the thick main roots within a radius of three or four feet. 'Citrus Canker' does not occur. A form of 'leaf mottle,' apparently merely *chlorosis*, is frequent and to check it applications of sulphate of iron are made. Indeed a measure of this substance is commonly included with the artificial fertilizer. Where the water-table is too high, 'die-back' appears; it is rare in the ordinary flourishing grove. In certain seasons, especially when the 'poniente' winds have been unusually prolonged, the 'transit rots' cause heavy losses. It is doubtful whether the blue and green moulds are due most to occasional unfavourable climatic conditions or excessive handling of the fruit.

Varieties and their seasons. The nine or ten varieties named in the nurseryman's catalogue are all included by the packers in one or other, of the three classes—'White,' 'Blood,' or 'Blood-oval,' and the most popular are Pajarito, which ripens in November: Naranja comin dulce de la Ribera, also maturing in November: Cadena punchosa, a most important variety in the trade, in season from December to April: Viciado is at its best in January and February: but by far the most important shipping orange is the Vernia or Berna, sometimes called the Late Valencia, its season being from March to June. By the nurseryman, the two blood oranges are named Sanguino oval entre-fino, and Sanguino oval double fino. Of the Mandarin species several varieties are grown which differ considerably in size and quality but none is known by a distinctive name. In its proper season each variety has merit and the most popular have high excellence in size, quality or suitability for export. The Valencian does not esteem the 'blood' orange, more than the 'white,' indeed he prefers the latter, yet all admire the attractive beauty of the incrimed fruit. The number of pips in the best trade varieties is small, rarely exceeding seven. The 'blood' orange and the late Valencia are practically seedless. Perhaps no variety is so perfectly sweet as the very best Washington Navel, yet the popular Valencia oranges have greater sparkle and piquancy and on the whole are more constantly pleasing.

The orange growers life is communal. In some parts he dwells by his grove, but more commonly he lives in the village or town merely having a house on the land where his family spends the warm period of the summer months.

Labour and wages. With only slight variation the experienced and skilful workers are paid as follows:—

Picking gang.

Men	.	.	.	.	4s. 6d. per day of 8 hours.
Women	.	.	.	.	2s. 6d. per day of 8 hours.
Boys	.	.	.	.	3s. per day of 8 hours.

Packing-house gang.

Women sorters	1s. 10d. per day of 8 hours.
Women wrappers	1s. 10d. per day of 8 hours.
Women packers	2s. 3d. per day of 8 hours.
Overseer	2s. 3d.
Foreman	5s. 7d.
Carpenter	5s. 7d.
Binder	5s. 7d.
Porter	5s. 3d.

To convey the cases from the grove to the wharf the carter receives from 4s. 6d. to 6s. a load approximately 2d. to 2½d. per case.

The cost of living. Bread is the veritable staff of life in Valencia. A family consumes a daily average of 1½ lb. per head. Bread constitutes a substantial basis of the working-man's nourishment, and anything which supplements it is of secondary importance merely serving to give it relish. The following may be taken as the daily bill-of-fare of a Valencia farm labourer :—

1 lb. loaf of bread,
1 to 1¼ oz. salt cod, or two sardines,
½ pint wine.

The cost is approximately 4½d. to 5d.

Dinner (about 1 p.m.)

1 lb. loaf of bread,
½ lb. rice prepared with oil and vegetables.
Oil,
Vegetables,
Dessert,
Wine.

The cost is approximately 6d. to 7d.

Supper (about 7 to 8 p.m.)

This is similar to the breakfast fare, varied by a stew of potatoes or beans with salt cod.

The total cost of the day's food is approximately 1s. 3d. to 1s. 6d.

Clothing : A labourer's outfit of rough cotton ware, mostly of Catalan manufacture, is made up as follows :—

Trousers,
Blouse,
Shirt,
Vest,
Socks,
Shoes (Canvas),
Cap.

The cost is approximately 11s. to 12s. To which may be added, if the man is prosperous :—

Ring,
Jersey,
their cost being about 15s.

Wages have advanced 20 per cent. during the past 15 years; clothing and house rent during the same period 30 per cent.; so that the circumstances of the labourer appear worse than they were. He has a limited conception of life, its needs and ambitions, and lives without undue anxiety, ambition, or much forethought.

The cost of growing the fruit. As the growers are nearly all peasants, owning or renting small holdings, the cost of producing the oranges—the profit or loss—can hardly be accurately determined. The work is done by the family, living humbly and frugally. The following is an average of several estimates :—

<i>Per acre.</i>												
										£	s.	d.
Rent	.	.	.	.	.	.	.	.	.	15	0	0
Fertilizer	.	.	.	.	.	.	.	.	.	5	0	0
Ploughing—twice	.	.	.	.	.	.	.	.	.	8	0	0
Weeding—twice	.	.	.	.	.	.	.	.	.
Hoeing four times	.	.	.	.	.	.	.	.	.
Irrigation and its application	.	.	.	.	.	.	.	.	.	2	10	0
										30	10	0

No charge is included for fumigation, which costs at least £6 per acre, and should be done each alternate year.

The return to the grower per acre may be as follows :—

										£	s.	d.
150 cases oranges at 4.6d. each	.	.	.	.	.	.	.	.	.	33	15	0
Cost of production	.	.	.	.	.	.	.	.	.	30	10	0
Nett profit										3	5	0

Apparently the average yield of 150 cases per acre is not very profitable to a tenant. As in all other branches of farming it is the producer of better than the average who finds the enterprise profitable. Who gains only the small nett profit is at least provided with congenial and uncontrolled labour for himself and his family.

The rent, or the price of a grove. Agricultural land in the Valencia district is much subdivided, the holdings ranging in size from two to twelve acres, most of them being of the smaller dimension. Assisted by his family, the peasant-owner or lessee carries out the operations

without hiring labour. Most frequently the grove is the property of the actual grower, though land for other temporary crops may be hired. There are very few extensive groves. The rent of an orchard of full bearing age is about £15 per acre. Or other forms of agreement may be concluded by which, for example, the tenant or lessee contributes the work in cultivation and meets all other expenses, whilst the owner receives as rent half of the gross return. The outright purchase price of a full bearing healthy grove is never less than £250 per acre, and not infrequently is as high as £400. Indeed much higher prices are occasionally paid for groves of exceptionally great merit. Here, as in America, Australia and elsewhere, the possession of a grove is coveted not alone on account of its financial worth.

The sale of the crop. Although the grower may speculate when he shall sell his crop, this is as far as he goes in its disposal. He may sell the fruit as it hangs on the tree, but more often the oranges are sold by the thousand. The packer makes a cash deposit when the agreement is concluded and pays the balance when the fruit is taken from the grove. The grower takes little or no part in the harvesting. The packer does the picking, packing and shipping. The prices vary each year and at different times in the season. The brokers have estimated that the grower begins to make profit only after he receives from 15s. to 16s. per thousand oranges on the trees. The opening price in the November markets is sometimes as low as 15s. per thousand, but it invariably rises as the season progresses and sometimes is twice or three times that price.

The buying agents. The export trade is carried on through the packer and the broker whose agent resides in Valencia. The broker does not usually buy the oranges; he ships and markets them for account of the Spanish packer. Due to competition between the brokers to obtain the fruit, the packer is sometimes financed by the broker. Indeed some packers have that credit only which the broker is disposed to allow them. In his capacity as buyer the packer meets the cost of all the operations from the picking of the fruit until it is alongside the ship. The broker arranges matters of finance and shipping facilities for the packer, who in turn relies on the broker for the final disposal of the fruit. There are indications that the packers' business is a speculative one. The grower naturally follows the principal markets and advances the price of his fruit when he learns of a rise. The large broker, on the other hand, carefully observes the packers' operations to see that he does not pay too high prices, and that he is delivering packed cases to correspond with the advances that have been made to him. In seasons of rising markets the position of the packer is an easy one, but when

there are great fluctuations, or when the oranges are not carrying well, his business is precarious. As the resources of many of the packers are limited, it is probable that a part of their losses sometimes falls on the grower. For this reason the grower inclines to sell, when he can, direct to one of the well-known exporters or brokers. On the other hand, some of the brokers enter into a joint account with the packer, so that together they may share the profits as well as losses. Several of the Spanish packers maintain representatives in the principal northern markets. These men constitute for the packers a direct source of market-information distinct from that provided by the brokers. They appear at the docks when the cargoes are being discharged and satisfy themselves that the fruit is being classified properly. They are present at the auction and represent the packers' interests when necessary. Owing to the fact that the Spanish packer is to a large extent financed by the broker, his market representative is not in an independent position and he cannot therefore be as effective in protecting the packers' interests as he could be under untrammelled conditions.

Gathering the fruit. The Valencia orange does not attain its best quality until January. The season of harvest however begins in November, and ends in June. The heaviest shipments are made in January, February and March. The picking is controlled by the packer employing his own men. An experienced picker in a fair good year gathers 4,000 fruits per day. With a soft lined basket over his shoulder he collects the fruit and piles it at convenient points to a depth of 2 to 3 feet, here to remain for one or two days to sweat and mature. A protecting canvas or tent is sometimes placed over the heap.

The packing-house. In construction the packing-house is usually a lofty, open, spacious, double-span-shed built on modern lines, having ample light, and it is kept scrupulously clean. On arrival the cart bringing the fruit runs into the shed where men transfer the oranges by suitable baskets to wide flat piles, again from 2 to 3 feet deep. To mature the oranges, to toughen their rind, the piles may remain undisturbed for three or four days. Then the grading, cleaning, wrapping, and packing commence. Almost exclusively women are employed in these operations and as they are paid by the day, not by the output of work, everything is steadily and efficiently conducted. The labour employed in the house comprises porters, graders, cleaners, packers, a carpenter, a foreman, etc. A house may employ from 50 to 100 men and women and turn out 150 to 300 half cases per day. As a rule and always when experienced labour is locally available it is employed, otherwise gangs are brought from elsewhere in the district.

Grading. This is done by experienced women who are truly clever in sizing the fruit. The soiled, the smutty, the scale-blemished are culminated and placed to be rubbed, first with damp, then by dry pine sawdust, and finally polished with a soft brush or cloth.

Wrapping. The wraps are of silk paper, bearing the packer's own distinctive brand mark, which is often more delicately artistic than strikingly attractive. The paper is supplied by the local mills in bales containing 15,000 sheets of 20" \times 30"; weighing about 165 lb. per bale of the best quality. The price of the paper per bale ranges from £4 to £6: the printing charge varies according to the design and the number of colours employed, but may be from £1-5 to £3 per bale. A bale contains paper for 300 half cases. The wrapping is done by women who have attained great skill in the work. As each orange is enveloped it is given a deft spin in a manner that leaves the tissue gripping the fruit, with two tight pig-tails securing the wrap. It is said that the wrap remains secure on the oranges which are sent loose by rail in wag-gons.

Packing. A little girl feeds the wrapped oranges into the case while two women pack them. Almost invariably the straight pack is favoured and it is exceedingly well done. It is so accurate that clear, clean lines of day-light show right through the open spaces of each of the four sides of the case. The shippers much appreciate this good packing which allows the air to circulate freely around the fruit. Two women, assisted by a girl, pack about 35 half cases per day. The total cost of the labour employed in the packing house from the arrival of the oranges until they are loaded for conveyance to the steamer is estimated to be fully one shilling per half case.

Lidding. No pressure is used in lidding the cases. The 'bulk-heads' are crowned above the ends. The lidden nails down the top slats and gives them a turn with the plane. To reinforce the parts which are weakest, strap-iron, or thin tape of hide or even pleated rope is used. Then the case is finally bound by strong 'esparto' grass-rope with three strands around its middle. It is upon the security and strength of these three strands that the safe transport of the case depends when being slung into or discharged from the lighter; and to the credit of the 'esparto' and the binder it may be said that rarely does the triple bond give way.

The orange case. The case is supplied by the local saw mills, of which there are several in the orange belt. The wood is delivered cut to lengths all ready to be put together by the packing-house carpenter. Pine timber from Portugal, Minorca, and to a small extent from the woods of Spain is exclusively used. The case has no standard measure-

ments, its size varying to some extent according to the 'counts' packed. There are usually three grades of fruit—'extra selected,' 'selected,' 'superior,' and the 'counts' are as follows:—

Half case.

Oranges in case.	Gross weight lb.
200	116
240	124
300	115
360	165
504	125

Full case.

420	166
420 large	170
420 extra large	200
714	200
1,064	215

The cost of the wood for the half case is about 1s. 6d.; for the full case 2s. 5d.

The cost of packing a half case. The following are approximate figures:—

	£	s.	d.
Fruit	0	5	3
Case	0	1	6
Paper	0	0	6
Nails	0	0	2
Cord and strapping	0	0	3
Transport	0	0	9
Light, rent, travelling, matricula, wastage	0	0	9
Labour, picking and buying	0	0	6
Labour, warehouse, carpenters, roping and loading, unloading and portorage, grading and cleaning, wrapping, packing, Insurance and Miscellaneous	0	1	0
	0	10	8

Shipment. From the grove to the packing-house nearby, from the packing-house to the wharf, the oranges are carried over roads which often are very rough, almost invariably on double-decked springless country carts. Yet it cannot be said that the fruit is ever subjected to very trying or damaging treatment, so thoroughly are the men employed accustomed to handling the crop. On arrival at the quay the

cases are placed in sheds administered by the 'Caballero' loading agent, or owner of a 'caballett', which is a section of the quay allotted to an agent with loading rights. The agent owns a small fleet of flat barges, and on these the cases are lowered by means of simple pulleys. The barge is towed to the side of the steamer, and the packages lowered to the hold by means of the ship's gear. The quay sheds are lofty, light and modern; from Valencia to London the voyage is about 2,000 miles and from the time of loading to unloading some eight to ten days may pass. Yet the freight rate to almost any port in North Europe is only 1s. 3d. to 1s. 9d. per 110 lb. of fruit. Railway freight is on the other hand very high. To send a half case by rail from Valencia to Madrid costs 10s.; the steamer freight of a case to England is only 1s. 3d. The cases are shipped in small Scandinavian or German steamers, and the competition for the transport is keen.

Selling charges. These are agreed upon by the brokers in the ports of arrival. The average charge at present is 3 per cent. commission and an inclusive charge of 1s. 3d. per package. The rate differs in the various ports and according to the expense entailed. Occasionally it is as much as 6 per cent. The inclusive charge is fully detailed on all account sales forms from the United Kingdom. The bulk of the fruit is sold at auction, although in the Covent Garden Market a quantity of special fruit is cleared by private sale.

Bulk or loose oranges exported. A considerable proportion of the oranges sent to Paris and the other French markets is simply wrapped and loaded into freight cars that are lined with straw. The wrapped fruit is transferred from the packing-house to the railway in flexible lined baskets of various styles and sizes. The railway wagon is divided into tiers, the floors of which are carpeted with straw. The wagon is suitably ventilated and may carry either 5,000 or 10,000 kilos oranges, the former being the most generally used. The quality of the fruit sent in this way varies much more than that despatched by steamer in packed boxes. The loaded waggons are railed up to the Spanish-French frontier, and there owing to a difference in the railway gauge, the oranges are transferred from the waggons of one country to those of the other. Forwarding agents attend to the transfer of the fruit, eliminate decaying or damaged oranges, and send the waggons to the markets under instructions from the distributing houses. The trucks proceed chiefly to Paris, Mons, Lille, Geneva, Munich, Basle and Brussels where the sale is by the 100 kilos. This branch of the citrus export trade has greatly expanded in the past few years and large quantities are being forwarded. In some instances trucks of fruit are purchased by the distributing agents, but, as with the cases, the greater part is shipped

on a consignment basis. There is some prospect of various improvements being effected in carrying on this trade in loose fruit. To overcome the difficulties and losses entailed in transferring the oranges from the Spanish to the French or other European waggons, it is proposed to adopt a truck having variable wheels which may be adjusted to suit the unequal railway gauges. Considerable quantities of loose but wrapped oranges are also carried by coasting steamer to frontier ports and there transferred to waggons which are despatched to the markets.

Handling the fruit. From the picking until the fruit is transferred to the ships or waggons the oranges are certainly handled a great deal yet always with considerable care and skill by men and women long accustomed to dealing with the orange. In the hope that in future less handling at a lower cost may be necessary and that the loss due to decay in the cases may be reduced, two or three modern packing houses are operating in Valencia. There the fruit is graded, washed and polished mechanically. The houses have not been operating long enough to demonstrate their suitability to the Spanish trade wherein the daily wages still are moderate, and experienced men and women are easily hired. It is certainly true that not a large proportion of the oranges need any cleaning, and the women are remarkably accurate in grading, etc. Still the modern houses claim that their machinery improves the appearance and hence the general grade of the fruit. If they were paid on their daily output, labour would undoubtedly work more rapidly than at present, but few would be so contented. It is also suspected that some of decay to which undue handling is ascribed is due to picking varieties out of seasons or after the warm moist winds which sometimes arise during the season have affected injuriously the carrying qualities of the fruit. In the modern houses the use of disinfectants is being tried.

Marking the oranges. A few exporters are marking their oranges by means of rubber stamps either by hand or by a machine, but the qualities of the various packs are so clearly defined and so well recognized in the trade that this would appear to be an unnecessary addition to the cost of production. Then the stamp is rarely clear or very striking.

By-products. There exists a good local market for the fruits which are not suitable for export. Nevertheless a few houses in Ribera and Murcia produce some essential oils, citric acid, essences and preserves. It is believed this trade might be considerably extended.

Co-operation. The growers are very individualistic and refused until a few years ago to adopt any form of co-operation. Federations

now exist in several places, but are devoted rather to the co-operative purchase of fertilizers and supplies than to selling the crop. Those who produce the best oranges very naturally claim that averaging the product injures them and benefits the grower of the inferior qualities. It is said the federations handle about 1 per cent. only of the packages shipped.

New varieties and the 'grape fruit.' The Washington Navel orange and the Grape fruit are being tried with some success, though on a very small scale so far.

Extension of the season. To compete with the oranges from Australia, South Africa and America, in the summer months, attention is being devoted to the extension of the area under the Vernia or Late Valencia variety.

Competition. The two most important competitors of Spain are Italy and Jaffa, and their seasons coincide with the Spanish output. Then follow the United States of America with a navel orange; Algeria sends mandarines; and small quantities of the tight-skin fruit arrive on the markets from Tripoli, Syria, the Argentine, Brazil and the West Indies.

Italy consigns the greater part of her oranges loose in waggon to Hamburg, Bremen, the interior German markets, Central and Eastern Europe, including the Balkans. Some consignments to the Hamburg and German markets are effected in cases, but a large bulk trade is carried out and fostered by the Government and railway companies providing quick transport and advantageous rates. No Italian oranges are consigned to England, neither the package nor the fruit being popular on her markets. It is on the German markets that the oranges from Spain meet active competition from Italy. The Italian crop is estimated to be from 2 to 3 million cases, according to the season.

Jaffa is distinctly the most important competitor. The Jaffa orange being good in quality is becoming popular on the English markets. Having a tough, rather thick skin, it bears transport exceptionally well but it is not attractive in appearance. The crop is estimated at 1,500,000 cases. The United States oranges are offered in February and in diminishing quantity throughout the months till June.

The Algerian mandarines are shipped in cases chiefly to Paris and Marseilles, the prices realized being generally satisfactory. The export is facilitated by excellent steamer services between Algiers and Marseilles, Algiers and Port Vendres, and also by railway facilities and Government protection. The fruit is inferior to the Spanish mandarin. The French Government is vigorously encouraging the planting of superior varieties, and a tax on oranges is being imposed on the product

of countries other than Algeria. The Italian colony of Tripoli is also encouraging the production of oranges for export.

Extension of the Spanish groves. Although no large new plantations are much in evidence, it is reported that small groves set out in the past few years must soon contribute a very substantial addition to the orange crop. As the bearing trees are in good health, an increase in production may be expected. Considerable areas of new land are being brought under irrigation and it is confidently anticipated that extensive groves will be planted thereon.

Outlook of the industry. The trade is at present flourishing. Those in a position to have a general outlook of the industry are at times troubled about the future prospects of the growers. The groves of Spain and the other competing countries are extending; the markets are not substantially widening. Yet the spirit of cheerful hope prevails. Russia may once again become an important purchaser; the consumption of oranges in Spain, it is hoped, will increase very much.

Dated 14th March 1929.

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